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AN EMPIRICAL STUDY OF TALENT MANAGEMENT INITIATIVE ON ORGANIZATIONAL PERFORMANCE: A MECHANISM FOR SOFTWARE PROCESS IMPROVEMENT (SPI) IN SOFTWARE ENGINEERING ENTERPRISES IN NIGERIA.

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Abstract
Despite significant progress in software engineering, many projects still fall short in terms of schedule, budget, and customer satisfaction. To address this issue, more research is required in the area of Software Process Improvement (SPI) within software engineering companies, and one effective way to do this is by improving the expertise of practitioners, as the knowledge of a company's employees is its major asset, and as a result, talent management (TM) becomes necessary. Given this, the research aims to present empirical evidence on Talent Management methods at selected software companies in Ibadan, Oyo State, Nigeria, and to provide a framework for Talent Management usage by software engineers and project managers. Surveys were conducted with descriptive statistics (frequency and percentage) using SPSS to acquire the necessary data. The study revealed that existing methods in the case study organizations were insufficient to prevent recurring software crises, thus the need for a mechanism or framework to manage and retain talents.
Keywords: Talent management, Software Process Improvement (SPI), Software engineering, Software enterprises, Organizations, and Software Crisis.

Introduction
In today's dynamic and ever-evolving business environment, organizations, as result-oriented entities suitable for realizing predetermined goals and objectives, are adopting a variety of methods to assure their survival due to the complexity and strong competition inherent in the business environment at both micro and macro levels. An organization's ability to achieve its goals and objectives is what defines it as a successful organization, and this is the only way to ensure its long-term viability. To achieve this feat, an organization with a highly-talented workforce in addition to its corporate goals needs to take a bold step towards taking as crucial retaining employees' talents in a bid to maintain a healthy relationship with the business environment and acquire resources needed for its business operations, towards ensuring its survival in today's dynamic and evolving business world. "Talent Management" has been in existence for over three decades and it needs to be noted that to be successful, a company must recognize, manage, safeguard, and maximize its assets. Taking into cognizance the fact that a

considerable amount of organizational knowledge is undocumented, most businesses have come to terms with the realization of the fact that when employees leave, they take their knowledge with them. Increasing employee mobility has led to an increasing need for Talent Management (TM) to help organizations retain individuals and, more significantly, their expertise (Sven and Mikael, 2003). Talent Management (TM) is the act of recording, developing, sharing, and effectively and efficiently utilizing Organizational knowledge (Davenport and Thomas, 1994). It is a discipline that encourages an integrated strategy for identifying, capturing, analyzing, retrieving, and sharing all of the enterprise information assets. Among these assets are databases as well as papers, regulations, and processes, as well as the knowledge and competence of individual employees that had not yet been collected (Michael, 2012).

Organizational effectiveness has always been a topic of debate in the workplace, and it continues to be till today. To rate one organization as more effective than another is nearly impossible because what one organization considers effective may be perceived differently by another. This has led to a growing interest in learning more about what makes an effective company. An organization's focus on improving performance, competitive advantage, innovation, the exchange of lessons learned, and organizational integration are common targets for initiatives in Talent Management (TM). Developing high-quality software at low cost is the goal of Software Engineering, an engineering discipline. "Software is an abstract and intangible" (Sommerville, 2007) and as a result, no materials, physical laws, or manufacturing processes can limit its capabilities. The fact that software has no physical boundaries, makes it easier to design. However, natural restrictions can lead to enormously complex and difficult-to-understand software (Sommerville, 2007). We refer to this group of activities as the "software process" since they are aimed at the creation or evolution of software. Software Process Improvement (SPI), on the other hand, is a technique for developing quality software that is systematic and continuous and aims to improve an organization's ability to produce high-quality software. In the software development process, SPI ensures progress by fostering new information and understanding (Sven and Mikael, 2003).

As a key principle, a company's software process should be improved depending on the ability and expertise of its practitioners. One of the biggest challenges is to devise strategies and processes for keeping up-to-date information about software development and maintenance in the cloud. To enable the production, updating, and sharing of knowledge about software processes in any business, insights from the subject of knowledge management can be valuable (Finn, 2007).

Literature Review

After a brief discussion of what software engineering is, we come closer to our focus area and review the work done in the past, as well as numerous perspectives on the topic of software process improvement and talent management from a wide range of academics and practitioners.

Software Engineering

When it comes to the creation of high-quality computer programs, software engineers use a wide range of methodologies, techniques, and tools from Software Engineering (Pressman, 2010). It is possible to build complicated systems fast and with high quality using software engineering as a solution to pre-software engineering software crises. Many individuals can be kept occupied for a long period maintaining software for major projects because a project's success or failure

is dependent on a wide range of variables. Software engineers are required to learn some basics of project management and its hazards and focus on what makes projects successful. Like any other branch of engineering, software engineering necessitates the use of numerous tools needed in its various phases, including requirements gathering, system design, implementation, testing, deployment, and maintenance, and this is usually referred to as Software Development Life Cycle (SDLC).

Software Process Improvement

Software development and maintenance methods and transformations are documented using standardized documentation practices. "Software Process Improvement" refers to the process of systematically documenting the actions, methods, practices, and transformations that are used by software developers and maintainers to create and maintain software and its associated product (Mamta and Sona, 2013). To improve product quality, team productivity, or lower development time, a software process improvement approach is an integrated set of procedures, tools, and training (Sommerville, 2011). The purpose of process improvement is to gain a better understanding of current processes and make adjustments to increase product quality and/or minimize costs and development time. When it comes to improving and changing processes, there are two main approaches:

i. The Process Maturity Approach
ii. The Agile Approach

The Process Maturity Approach (PMA): The major purpose of the PMA is to increase the quality of the product as a result of the improved procedure. The technique aims to improve business processes and project management through the incorporation of sound software engineering principles.

The Agile Approach: The most important aspect of this method is its ability to supply functionality quickly and adapt to changing client needs. Formality and documentation are purposely avoided to focus on the code being written. For small to medium-sized initiatives, Sommerville (2011) recommends it as the most cost-effective process optimization technique. The maturity-focused approach to process improvement, on the other hand, was advised for large and essential systems, as well as systems involving developers from multiple firms. According to Humphrey (1988), W.E. Deming, an American engineer who worked with Japanese industry following World War II to enhance quality, shared this attitude. According to Deming's work, a link exists between the concept of statistical quality control and the total number of faults in a given product. Defect detection and reduction are the goals of this project, which aims to reduce the number of product defects by analyzing and improving the process. The process standard will be established based on the lowest defect count, and the improvement cycle will commence. Talent management approach to software enhancement focuses on this perspective, which is referred to as the people's ware of the process. This is because software development is a creative activity that relies heavily on people and their collective knowledge and talent management also focuses on retention of people's knowledge for optimum organizational effectiveness and efficiency.

Talent Management

Talent management is a critical aspect of the development of both individuals and organizations in the current business environment (Balu *et al*, 2019). It is the strategic approach to identifying, developing, and retaining key employees to enhance an organization's business value and achieve its goals, thereby improving overall organizational performance. In other words, predicting and planning for an organization's future human resource needs is the goal of talent management. The most valuable assets of a company are its talented employees, as they possess the skills, knowledge and abilities that are essential to the company's success, and their contributions and productivity are crucial to achieving the company's goals and objectives. Therefore, it is important for organizations to identify, develop and retain these talented employees through effective talent management strategies in order to drive company growth and success. Ingram, (2016) asserts that an employee who has great potential and the capacity to adapt to the organizational processes as well as the necessary technical know-how for the job is deemed talented. Such employees not only possess the necessary technical skills and knowledge for their role, but also have the ability to adapt to the organization's processes and culture, and the potential for future growth and development. They have a strong work ethic, possess a positive attitude, and have a willingness to learn and take on new challenges. These qualities make them valuable assets to the organization, and organizations should focus on identifying and nurturing such employees through effective talent management practices.

Organizational Effectiveness

Organizing, according to Barney and Wright (1998), is the process of aligning various personal activities and resources, including human, physical, and capital assets, in order to achieve a shared objective. It involves the coordination of resources to create a cohesive system that works towards a common goal. Chaturvedi (2016) opines that for an organization to thrive and sustain in the ever-changing business environment, it must have a well-planned succession planning system. This includes aligning the workforce with the organization's goals and objectives, developing a strategic succession planning process, and understanding the importance of talent management, talent retention, and talent pool building. If effectively utilized, succession planning can be considered as a crucial tool in an organization because every aspect of talent management, such as performance measurement, talent positioning, training, and building plans, as well as investment in future strategic talent plans, are important for a successful succession planning process.

Talent Management and Organizational Performance

All organizations are better off with the proper talent, as having a talented workforce, especially in this era of globalization and competition, provides a competitive advantage for an organization. According to Malaolu and Ogbuabor (2013), an organization's productivity and efficiency can be improved by efficient talent management policies and procedures. As a result of this dedication, employees are more engaged, which leads to lower employee turnover. It is possible to boost the productivity of employees by implementing integrated strategies that are meant to attract, develop, retain and utilize individuals who have the essential skills and aptitude to satisfy current and future business needs", (Khokher & Raziq, 2017). Payambarpour & Hooi (2015), examined the importance of considering employee engagement as a key factor in the relationship between strategic HR inputs and organizational performance. The study emphasizes the need for organizations to focus on talent management strategies that promote employee engagement and align with the overall goals and objectives of the organization. This includes,

but is not limited to, providing opportunities for employee development, fostering a positive work culture, and encouraging employee participation and feedback. Ultimately, the study suggests that organizations should prioritize management development and employee engagement in order to enhance organizational performance and achieve long-term success in a multinational business environment. Organizations must develop talent management policies and procedures that benefit people as well as improve organizational performance and reach organizational goals, which means they must use talent management techniques to that end. This is crucial since it acts as an important way to secure the commitment of employees, given the extremely competitive period that businesses have been ushered into and the requirement for a highly competent team to survive.

Application of Talent Management (TM) to Software Process Improvement

Numerous empirical studies in SPI and TM have been undertaken utilizing various case study methodologies (Mamta & Malhotra, (2013). Talent management in software process improvement has been the subject of numerous studies, the most recent of which was completed by Finn (2007). There are four methods that can be used in a software process improvement setting to codify and personalize knowledge: Mentoring, the Rational Unified Process (RUP), Process Workshops, and the Post Mortem Analysis. He categorized the studies according to the framework and reported findings on the major concepts that have been investigated empirically. Sven and Mikael, (2003) used the case studies technique to observe the influence of software process optimization strategies in several Siemens software development businesses. Researchers found that knowledge management insights could be valuable in software process improvement initiatives to assist the creation, modification, and distribution of software processes in any business.

According to Finns (2007), knowledge management insights can be applied to software process improvement efforts to make it easier for organizations to create, modify, and share software processes. There was, however, no model or framework in place for the use of talent management for software process improvement by these organizations, which is what this effort aims to address.

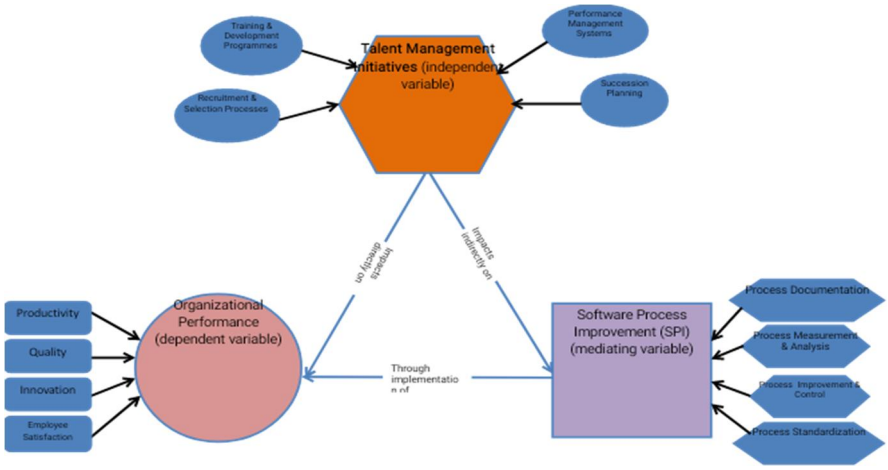

Fig. 1. A conceptual model of the Impact of TM Initiatives on Organizational Performance and SPI
Source: Researcher's Proposition, 2023

Methodology

The sample for this study was drawn from a list of registered software organizations in Nigeria which were sought on the internet, with their profiles checked for suitability for this study. Information was gathered for this work by using a close-ended questionnaire which is aimed at providing empirical evidence of the relevance of the Talent Management (TM) approach to Software Process Improvement (SPI) to achieve improved Organizational performance. Data collected from the questionnaire were subjected to descriptive statistics (frequency and percentages) using Statistical Package for Social Science (SPSS).

Results

This discusses the analysis of the questionnaires through the information gathered from the respondents. The result of the analysis of the reactions of the respondents is as shown ('see Table 1').

Table 1. The existing talent management techniques in the selected firms.

S/N	**TM approach in software firms.**	SA	A	UD	D	SD
1.	My organization has a framework to manage her intellectual properties	10 (18.5)	13 (24.1)	8 (14.8)	13 (24.1)	10 (18.5)
2.	We usually hold a briefing/review section after the completion of a task	10 (18.5)	14 (25.9)	10 (18.5)	10 (18.5)	10 (18.5)
3.	There is available infrastructure for talent management in our organization	11 (20.4)	10 (18.5)	11 (20.4)	11 (20.4)	11 (20.4)
4.	There are available cultural environments for TM in our organization	8 (14.8)	13 (24.1)	14 (25.9)	11 (20.4)	8 (14.8)
5.	There are risk prevention and mitigation strategies against knowledge loss due to attrition in my company	9 (16.7)	11 (20.4)	14 (25.9)	11 (20.4)	9 (16.7)
6.	There are mechanisms for capturing talents and knowing who knows what in your company	9 (16.7)	11 (20.4)	14 (25.9)	11 (20.4)	9 (16.7)
7.	We make use of reusable software components in our organization	8 (14.8)	13 (24.1)	16 (29.6)	10 (18.5)	7 (13.0)

From the table above, 18.5% strongly agreed and 18.5% strongly disagreed about their organization's intellectual property management framework, with approximately 14.8% uncertain about talent management framework existence. For post-task briefing/review sections, 18.5% strongly agreed, 25.9% agreed, and 18.5% each disagreed and strongly disagreed; yet 44.4% agreed overall. While 38.9% agreed, 40.8% disagreed about talent management infrastructure; capturing knowledge saw 25.9% undecided, 16.7% affirming, and 20.4% declining. Regarding reusable software components, 38.9% agreed (14.8% strongly, 24.1% agreed) and 31.5% disagreed (18.5% disagreed, 13.0% strongly disagreed), with 29.6% undecided.

Measure if there are observable improvements in the application of TM techniques to Software Improvement Process (SPI).

In order to measure the impact of the Talent Management (TM) techniques and infrastructures on Software Process Improvement (SPI) in the case study organizations, we try to find out whether the organizations had experienced loss of knowledge due to loss of personnel, if there are occasion where individuals who owns key knowledge are becoming unavailable, and the impact of the use of reusable components on time and cost of development of a new system. The analysis of the responses of the respondents is as shown ('see Table 2').

Table 2. Observable Improvement on the application of TM techniques to SPI.

S/N	**TM techniques in SPI.**	SA	A	UD	D	SD
1.	My organization has experienced a loss of talent due to the loss of personnel	11 (20.4)	10 (18.5)	13 (24.1)	10 (18.5)	10 (18.5)
2.	There are occasions when individuals who own key talents become unavailable	9 (16.7)	11 (20.4)	17 (31.5)	9 (16.7)	8 (14.8)
3.	The use of reusable software components has resulted in reduced costs.	13 (24.1)	9 (16.7)	12 (22.2)	8 (14.8)	12 (22.2)
4.	The use of reusable components has resulted in a quick time of soft development	14 (25.9)	9 (16.7)	11 (20.4)	7 (13.0)	13 (24.1)

Table 2 indicated that about 38.9% of respondents agree to some extent that their organization has lost knowledge due to personnel departures, while 37% disagree and 24.1% are undecided. Similarly, 37.1% agree to some degree that key talent becoming unavailable is an issue, compared to 31.5% who disagree and 31.5% who are undecided, suggesting that existing infrastructures may not effectively counteract knowledge loss. In terms of reusable software components, 40.8% agree that they reduce costs, with 36.8% disagreeing. Additionally, 42.6% believe they lead to quicker software development, while 37.1% disagree. This highlights the potential benefits of reusable components in cost reduction and efficiency, suggesting a need for a Talent Management System to capture and reuse lessons learned for improved organization memory.

Summary, Recommendations and Conclusion

Summary

The analysis of responses and interviews with software development companies in Ibadan revealed several key findings regarding the application of Talent Management to the Software Improvement Process (SPI). Many organizations conduct post-task briefing sessions to share lessons learned, yet informal knowledge sharing prevails. Some respondents were uncertain about concepts like intellectual property frameworks, pointing to potential awareness gaps. Effective talent management infrastructures are lacking, and there's a need for improved initiatives and process enhancement in Nigeria's software industry. There's a lack of consensus on mechanisms for capturing both knowledge and talents within organizations. Furthermore, the

absence of risk prevention strategies against knowledge loss due to personnel attrition was evident. On a positive note, most Nigerian software firms utilize reusable components, contributing to time and cost savings.

Recommendation

Software engineering enterprises should adopt regular briefing and review sessions after completing tasks to enhance talent management and overall organizational performance. Additionally, it's crucial to establish a comprehensive framework for intellectual property management, invest in knowledge management infrastructures, implement mechanisms for capturing knowledge and identifying holders, promote reusable software components, and integrate software process improvement (SPI) within talent management strategies to drive organizational excellence.

Conclusion

This research underscores the significance of effective talent management and software process improvement in enhancing organizational performance in Nigerian software engineering enterprises. The study recommends the establishment of intellectual property management frameworks, investment in knowledge management infrastructure, mechanisms for knowledge capture, identification of knowledge holders, and the integration of software process improvement with talent management efforts to address current gaps and enhance overall performance. The research emphasizes the importance of strategic talent management for attracting, developing, and retaining the right employees, leading to improved organizational performance and goodwill. The findings are relevant in the context of challenges in retaining and attracting talent, advocating for rewarding strategies, development plans, and quality control, and suggesting increased investment in talent management strategies for sustainable development. The research holds value for both software companies and academic fields.

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